

STATIC CHARACTERISTICS OF THE FERROELECTRIC TRANSISTOR INVERTER

Cody Mitchell¹, Crystal Laws¹, Todd C. MacLeod², Fat D. Ho¹

¹The University of Alabama in Huntsville, Department of Electrical and Computer Engineering,
Huntsville, Alabama 35899, USA

²National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville,
Alabama 35812, USA

Abstract

The inverter is one of the most fundamental building blocks of digital logic, and it can be used as the foundation for understanding more complex logic gates and circuits. This paper presents the characteristics of an inverter circuit using a ferroelectric field-effect transistor. The voltage transfer characteristics are analyzed with respect to varying parameters such as supply voltage, input voltage, and load resistance. The effects of the ferroelectric layer between the gate and semiconductor are examined, and comparisons are made between the inverters using ferroelectric transistors and those using traditional MOSFETs.

Keywords: MOSFET, inverter, ferroelectric transistor

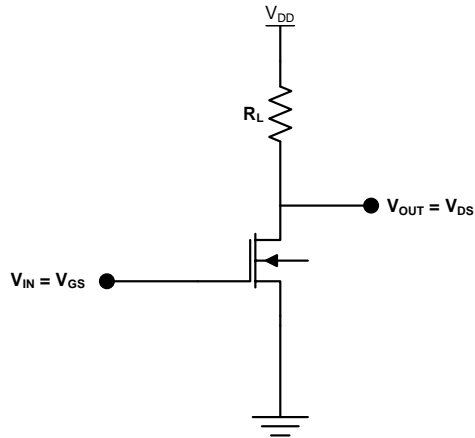


Figure 1. Circuit diagram of inverter using ferroelectric field-effect transistor

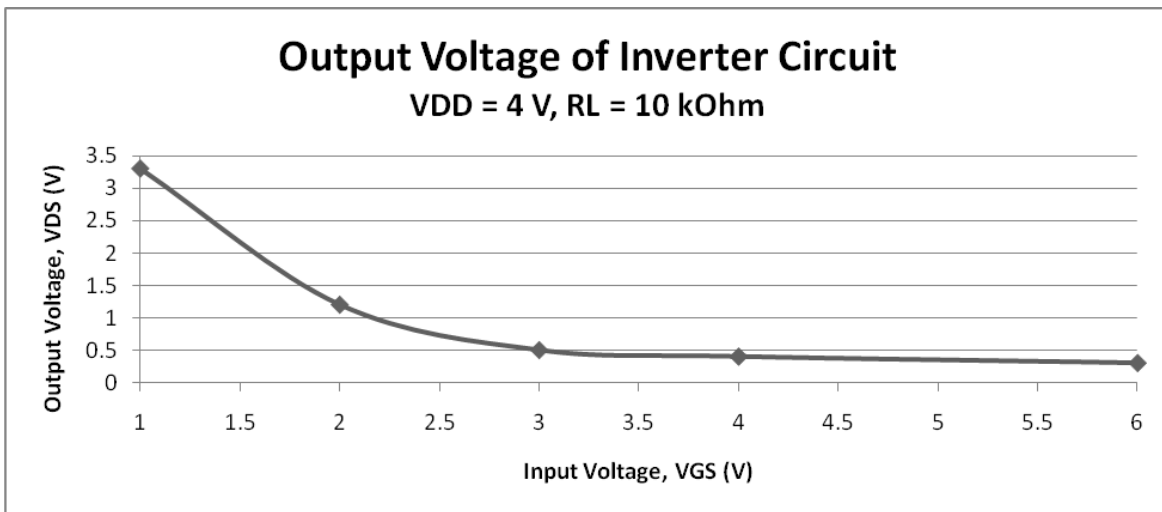


Figure 2. Output voltage of inverter using ferroelectric field-effect transistor, with supply voltage of 4 V and load resistance of 10 k Ω

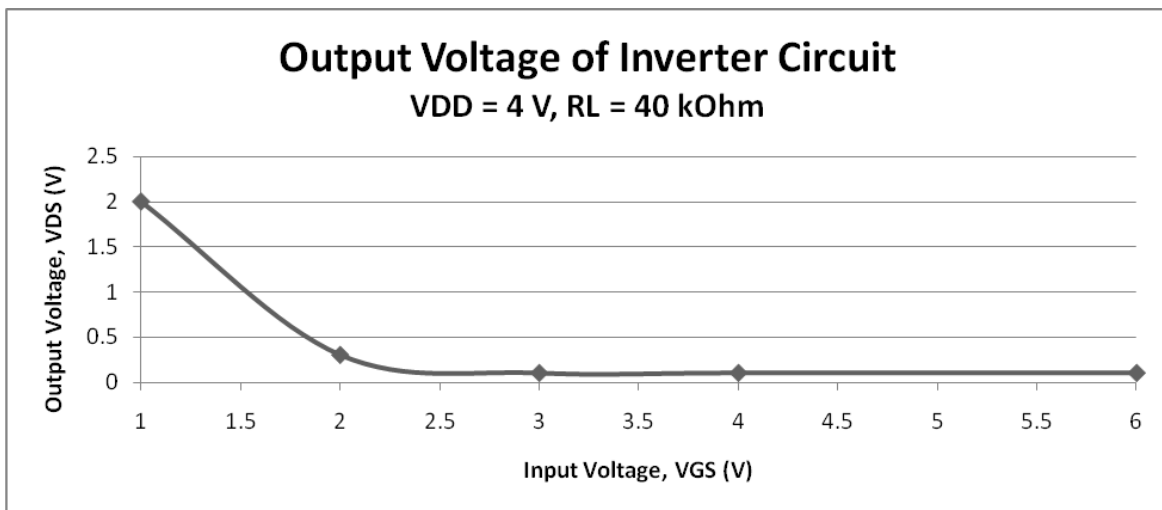


Figure 3. Output voltage of inverter using ferroelectric field-effect transistor, with supply voltage of 4 V and load resistance of 40 k Ω